

What is claimed is:

1. Apparatus for managing data flow in a router in a network, comprising:  
a congestion monitor for monitoring congestion status on each output port of the router;  
and  
a switch, upon detection of congestion on one of the output ports, for outputting data from a primary output path of the one of the output ports corresponding to a destination address of the data to be output, to an overflow path for the destination address.
  
2. The apparatus according to claim 1, further comprising:  
a congestion detector for detecting when the congestion has abated;  
said switch for further switching the output of data from the overflow path back to the primary path for the destination address.
  
3. The apparatus according to claim 1, further comprising:  
a memory for storing a forwarding table in the router, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least some of the destination addresses to enable overflow routing, one of the at least two output paths being identified as a primary path and other output paths being identified as overflow paths.
  
4. The apparatus according to claim 3, further comprising:  
a processor for determining, upon detection of congestion on the one of the output ports, which one of the at least two overflow paths from which to output the data based upon an amount of data currently assigned to be output from each of the at least two overflow paths.
  
5. The apparatus according to claim 4, wherein the processor further determining the amount of data currently assigned to be output from each of the at least two output paths;

determining which one of the at least two overflow paths has the least amount of data to be output; and

assigning the data to be output from the at least one of the overflow paths having the least amount of data to be output.

6. Apparatus for managing data flow in a router in a network, wherein the router includes a forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least some of the destination addresses to enable overflow routing, one of the at least two output paths being identified as a primary path and other output paths being identified as an overflow paths, the apparatus comprising:

a congestion monitor for monitoring receipt of congestion signals from at least two transmit buffers respectively associated with at least two output ports of the router;

a congestion detector for detecting a congestion signal from at least one of the at least two transmit buffers in the router; and

a switch, for all of the destination addresses in the forwarding table affected by the detection of congestion and eligible for overflow routing, for switching from the primary path to one of the overflow paths for transmitting the data.

7. The apparatus according to claim 6, further comprising a processor for determining when the congestion has abated based upon status of the congestion signals; said switch switching, for all of the destination addresses in the forwarding table switched to overflow routing, from the overflow path back to the primary path when the congestion has abated.

8. Apparatus for managing data flow in a router in a network, comprising:

a memory for storing a forwarding table in the router, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least some of the destination address to enable overflow

routing, one of the at least two output paths being identified as a primary path and any other output path being identified as an overflow path;

a congestion monitor for monitoring receipt of congestion signals from at least two transmit buffers respectively associated with at least two output ports of the router;

a congestion detector for detecting a congestion signal from at least one of the at least two transmit buffers in the router; and

a switch for switching, for all of the destination addresses in the forwarding table affected by the detection of congestion and eligible for overflow routing, from the primary path to the overflow path for transmitting the data.

9. The apparatus according to claim 8, further comprising:

a processor for determining when the congestion has abated based upon status of the congestion signals and

said switch switching, for all of the destination addresses in the forwarding table switched to overflow routing, from the overflow path back to the primary path when the congestion has abated.

10. A router, comprising:

at least one input port;

at least one output port;

a memory for storing a forwarding table, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least some of the destination addresses to enable overflow routing, one of the at least two output paths being identified as a primary path and any other output path being identified as an overflow path; and

a controller that detects a destination address for data to be output from the router, monitors congestion status of the at least one output port, and controls the output of the data from

the at least one output port based upon the destination address for the data and congestion status of the router.

11. The router according to claim 10, wherein the controller switches, upon detection of congestion on the at least one output port, output of the data from a primary output path corresponding to the destination address of the data, to an overflow path for the destination address.

12. The router according to claim 10, wherein the controller detects when the congestion has abated, and switches the output of the data from the overflow path back to the primary path for the destination address.

13. The router according to claim 10, further comprising:  
an overflow eligibility marker that identifies the destination addresses that are eligible for overflow routing and supplies identification information to the controller,  
wherein the controller stores the identification information in the appropriate entries of the forwarding table based upon the destination addresses.

14. The router according to claim 13, further comprising:  
an overflow route calculator that determines the at least one overflow path for each of the destination addresses identified by the overflow eligibility marker.

15. The router according to claim 14, further comprising:  
an overflow route populator that populates the forwarding table under control of the controller.

16. A router comprising:  
at least one input port;  
at least one output port;

first means for storing a forwarding table, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least some of the destination addresses to enable overflow routing, one of the at least two output paths being identified as a primary path and any other output path being identified as an overflow path; and

second means for identifying the destination addresses that are eligible for overflow routing, storing the identification information in the appropriate entries of the forwarding table based upon the destination addresses, determining the at least one overflow path for each of the destination addresses identified as being eligible for overflow routing, and storing, in the forwarding table, information for the at least one overflow path for each of the destination addresses eligible for overflow routing.

17. The router according to claim 16, wherein the second means is arranged to detect a destination address for data to be output from the router, monitor congestion status of the at least one output port, and control the output of the data from the at least one output port based upon the destination address for the data, the information in the forwarding table corresponding to the destination address, and congestion status of the router.

18. An apparatus for managing data flow in a network, comprising:

at least one input port;

at least one output port;

a memory for storing a forwarding table, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the apparatus for at least some of the destination addresses to enable overflow routing, one of the at least two output paths being identified as a primary path and any other output path being identified as an overflow path; and

a controller that detects a destination address for data to be output from the apparatus, monitors congestion status of the at least one output port, and controls the output of the data from the at least one output port based upon the destination address for the data and congestion status

of the apparatus.

19. Apparatus for managing data flow in a router in a network, comprising:  
a congestion monitor for monitoring congestion status on each output port of the router,  
wherein the congestion status is one of a plurality of levels of congestion;  
a congestion detector for detecting a level of congestion from the plurality of levels of  
congestion on at least one output port of the router;  
and a processor for determining an amount of data to be overflowed based upon the level  
of congestion and for switching, upon detection of the one of the plurality of levels of congestion  
on the at least one output port, the amount of data to be overflowed from a primary output path  
of the at least one output port corresponding to a destination address of the data to be output, to  
an overflow path for the destination address.

20. The apparatus according to claim 19, said congestion detector for further  
detecting when the level of congestion has abated; and said processor switching the output of the  
at least one output port from the overflow path back to the primary path for the destination  
address.

21. The apparatus according to claim 20, further comprising a memory for storing a  
forwarding table in the router, the forwarding table having entries respectively corresponding to  
destination addresses in the network and identifying at least two output paths from the router for  
at least some of the destination addresses to enable overflow routing and for storing, for each of  
the at least some of the destination addresses, a plurality of overflow data amounts respectively  
corresponding to the plurality of levels of congestion.